

Appl. No. 10/765,791
Amdt. Dated September 4, 2007
Reply to Office Action of July 12, 2007

SEP 06 2007

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1. - 49. (Canceled)

50. (Currently Amended) A polishing apparatus for polishing an object having a film on a surface to be polished, comprising

a table for holding the object, a portion of the table corresponding to the size of the object to be polished,

a measuring means for measuring data corresponding to a thickness of the film on the object,

a cathode member relatively small compared with the surface relatively smaller than the portion of the table corresponding to the size of the object to be polished, the cathode member and arranged to face a region of the surface the table,

an electrolytic solution feeding means for feeding an electrolytic solution at least between that in a region of the surface between the table and the cathode member,

a power supply for applying a voltage with the cathode member serving as a cathode and the film of the object to be polished serving as an anode,

a control means for controlling application of voltage until removing the target amount of film obtained from the thickness equivalent data when the film is electrolytically polished by electrolytic elution in that region of the surface, and

a moving means for moving the cathode member to other regions of the surface of the object to be polished in order to remove the target amount of film over the entire surface, and

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a control means for controlling application of the voltage and the speed of the moving means in order to remove a target amount of film by electrolytic elution in each region of the surface of the object to be polished.

Claim 51. (Cancelled)

52. (Currently Amended) A The polishing apparatus as set forth in claim 50, further comprising a calculating unit for calculating the target amount of the film to be removed from the a thickness equivalent data determined prior to beginning the electrolytic polishing.

53. (Currently Amended) A The polishing apparatus as set forth in claim 50, wherein the measuring means measures a the thickness of the film.

54. (Currently Amended) A The polishing apparatus as set forth in claim 50, wherein the measuring means measures an electrolytic current of electrolytic polishing in a region where the cathode member faces the surface, and the control means controls a voltage to be applied until removing the target amount of film determined by the electrolytic current of the electrolytic polishing in that region of the surface.

55. (Currently Amended) A The polishing apparatus as set forth in claim 54, wherein the control means determines the target amount of the film remaining at the point of

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time when the electrolytic current of the electrolytic polishing becomes a specified value to be zero and controls the electrolytic polishing in that region of the surface to finish.

Claim 56. (Canceled)

57. (Currently Amended) A The polishing apparatus as set forth in claim 50, wherein

the cathode member is divided into a plurality of regions which are arranged insulated from each other and the cathode member as a whole faces the entire surface portion of the table corresponding to the size of the object to be polished, and

said moving means comprises alternately and sequentially applying a voltage to each of the plurality of regions of the cathode member in order to effectively move the point at which electrolytic polishing occurs by changing the position of application of voltage to the divided cathode member, the substantially equivalent is obtained as when changing the position of the cathode member facing the surface from one region to another region.

58. (Currently Amended) A The polishing apparatus as set forth in claim 57, wherein the cathode member is divided into a plurality of concentric circular regions.

59. (Currently Amended) A The polishing apparatus as set forth in claim 50, wherein

the apparatus further comprises an anode member facing the surface and set apart from the cathode member at a certain distance,

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the electrolytic feeding means feeds an electrolytic solution between the region of the surface of the object and the cathode member and between the surface of the object and the anode member, and

the power supply applies a voltage to the cathode member and the anode member.

Claim 60. (Canceled)

61. (Currently Amended) A The polishing apparatus as set forth in claim 50, wherein

the apparatus further comprises a polishing means for chemical mechanical polishing, and

performs the chemical mechanical polishing in that region of the film at the same time as the electrolytic polishing to flatten the film.

62. (Currently Amended) A The polishing apparatus as set forth in claim 50, wherein the power supply applies a direct-current voltage with the cathode member as a cathode and the surface of the object as an anode.

63. (Currently Amended) A The polishing apparatus as set forth in claim 62, wherein the power supply applies a rectangular pulse voltage.

64. (Currently Amended) A The polishing apparatus as set forth in claim 59, wherein the power source applies an alternating-current voltage to the cathode member and the anode member.

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Claims 65.-89 (Canceled)

90. (Currently Amended) A plating apparatus for depositing a plating film on a surface of an object, comprising

a table for holding the object, a portion of the table corresponding to the size of the object to be plated,

a measuring means for measuring surface height data of the surface or thickness data of the plating film on the object,

an anode member relatively small compared with the surface relatively smaller than the portion of the table corresponding to the size of the object to be plated, the anode member and arranged to face a region of the surface the table,

an electrolytic plating solution feeding means for feeding an electrolytic plating solution at least between that in a region of the surface between the table and the anode member,

a power supply for applying a voltage with the anode member serving as an anode and the surface of the object as a cathode,

a control means for controlling application of voltage until forming by plating a target amount of the plating film deduced from the surface height data or the plating thickness data at the time of the measurement in that region of the surface, and

a moving means for moving the anode member to other regions of the surface of the object to be plated, and

a control means for controlling application of the voltage and the speed of the moving means in order to deposit a target amount of plating in each region of the surface of the object to be plated.

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Claim 91. (Canceled)

Please add the following new claims:

92. (New) A polishing system comprising a polishing apparatus and an object to be polished,

wherein said object to be polished includes a substrate and a film formed over the substrate, and

wherein said polishing apparatus comprises:

a table for holding the object,

a measuring means for measuring data corresponding to a thickness of the film on the object,

a cathode member relatively small compared with the upper surface of the film and arranged to face the upper surface of the film,

an electrolytic solution feeding means for feeding an electrolytic solution at least between a region of the upper surface of the film and the cathode member,

a power supply for applying a voltage with the cathode member serving as a cathode and the film serving as an anode,

a moving means for moving the cathode member to other regions of the surface in order to remove the target amount of film over the entire surface of the object, and

a control means for controlling the application of voltage and the speed of movement of the cathode until the target amount of film in each region is removed.

93. (New) The polishing system as set forth in claim 92, wherein

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the cathode member is divided into a plurality of regions which are arranged insulated from each other and the cathode member as a whole faces the entire surface portion of the table corresponding to the size of the object to be polished, and

said moving means comprises alternately and sequentially applying a voltage to each of the plurality of regions of the cathode member in order to effectively move the point at which electrolytic polishing occurs.

94. (New) The polishing system as set forth in claim 92, further comprising a calculating unit for calculating the target amount of the film to be removed from a thickness data determined prior to beginning the electrolytic polishing.

95. (New) A plating system comprising a plating apparatus and an object to be plated,

wherein said object to be plated includes at least a substrate and an upper surface, and

wherein said plating apparatus comprises:

a table for holding the object,

a measuring means for measuring surface height data of the surface or thickness data of the plating film on the object,

an anode member relatively small compared with the surface of the object and arranged to face a region of the surface,

an electrolytic plating solution feeding means for feeding an electrolytic plating solution at least between that region of the surface of the object facing the anode and the anode member,

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a power supply for applying a voltage with the anode member serving as an anode and the surface of the object as a cathode,

a moving means for moving the anode member to other regions of the surface of the object, and

a control means for controlling the application of voltage and the speed of movement of the anode until a target amount of the plating film is formed in each region of the surface.

96. (New) The plating system as set forth in claim 95, wherein the anode member is divided into a plurality of regions which are arranged insulated from each other and the anode member as a whole faces the entire surface portion of the table corresponding to the size of the object to be polished, and

said moving means comprises alternately and sequentially applying a voltage to each of the plurality of regions of the anode member in order to effectively move the point at plating deposition occurs.

97. (New) The plating system as set forth in claim 95, further comprising a calculating unit for calculating the target amount of the film to be plated from a thickness data determined prior to beginning the plating.

98. (New) The plating system as set forth in claim 95, wherein the speed of the anode is inversely proportional to the thickness of the deposited plating layer.

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99. (New) The polishing system as set forth in claim 92, wherein the speed of the cathode is inversely proportional to the amount of film to be removed by electrolytic polishing.

100. (New) The polishing system as set forth in claim 92, wherein the moving means provides for physical lateral movement of the cathode.

101. (New) The plating system as set forth in claim 95, wherein the moving means provides for physical lateral movement of the anode.